



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Criteria Pollutants: Sulfur Dioxide (SO₂)

Office of Air Quality – Air Programs Branch

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Description:

- Sulfur dioxide (SO₂) is one of a group of highly reactive gases known as sulfur oxides (SO_x). Highly reactive gases are those that have a high potential to change in composition under certain conditions of pressure, temperature or light, or upon contact with another chemical. For example, sulfur dioxide released into the atmosphere dissolves in water vapor to form acid rain.
- SO₂ is emitted from fossil fuel combustion at power plants and other industrial facilities.
- Other sources of SO₂ include industrial processes such as extracting metal from ore and the burning of high sulfur fuels by locomotives, large ships, and non-road equipment.
- Federal and state programs such as the Acid Rain Program and vehicle engine and fuel standards (*Tier 2 Tailpipe and Fuel Standards and Diesel Fuel Sulfur Standards*) have resulted in a substantial reduction of SO₂ emissions over the past 30 years.

National Ambient Air Quality Standards (NAAQS) for Sulfur Dioxide:

- The federal Clean Air Act (CAA) requires the United States Environmental Protection Agency (U.S. EPA) to set National Ambient Air Quality Standards (NAAQS) for six “criteria” pollutants that are considered harmful to public health and the environment. The six criteria pollutants are: particulate matter, carbon monoxide, ground-level ozone, nitrogen dioxide, sulfur dioxide, and lead.
- The NAAQS set limits for the criteria pollutants in the ambient air. Limits established to protect human health are referred to as “primary standards”; limits established to prevent environmental damage are referred to as “secondary standards”.
- The CAA requires periodic review of the science upon which the NAAQS are based, as well as the standards themselves. Primary and secondary NAAQS were first established for SO₂ in 1971. The most recent revisions to the standards was in June 2010 when U.S. EPA established a standard with a 1-hour averaging period and revoked the primary annual and 24-hour standards.
- The primary NAAQS for SO₂ measured over a 1-hour period is set at 75 parts per billion parts of air. To attain this standard, the three-year average of the 99th percentile of the daily maximum 1-hour concentrations cannot exceed 75 parts per billion.
- A secondary NAAQS for SO₂ measured over a 3-hour period is set at 0.5 parts per million parts of air. This standard cannot be exceeded more than once per year.

Environmental Impacts:

- Breathing SO₂ has been linked to an array of adverse respiratory effects including:
 - Narrowing of the airways leading to breathing difficulty (bronchoconstriction).
 - Increased asthma symptoms, especially during exercise.
 - Increased emergency department visits and hospital admissions for all respiratory illnesses and asthma.
- SO₂ is one of the primary contributors to acid rain, along with nitrogen oxides, which causes acidification of lakes and streams, damages trees at high elevations, and damages sensitive forest soils.
- SO₂ contributes to acceleration of the decay of building materials and paints throughout the country.

IDEM's Role:

- The Indiana Department of Environmental Management (IDEM) is responsible for protecting human health and the environment while providing for safe industrial, agricultural, commercial, and governmental operations vital to a prosperous economy.
- IDEM is responsible for protecting air quality in Indiana through the implementation of federal, regional, and state control measures, regulations, and ambient air monitoring.
- IDEM works to protect and improve air quality by monitoring air quality, issuing advisories for the public when air



A State that Works

- quality may be unhealthy, and educating citizens and businesses about their roles in improving air quality.
- Indiana operates an extensive monitoring network to gather data on levels of criteria air pollutants in the ambient air. The data is used to determine if Indiana's air meets the NAAQS. Areas within Indiana which meet air quality standards are classified as "attainment" or, if they exceed the air quality standards they are classified as "nonattainment".
- For areas not achieving (attaining) air quality standards, IDEM will work to help communities implement programs to achieve the standards as quickly as possible.
- Data from Indiana's air monitoring network is also used to identify trends in Indiana's air quality and to provide information for U.S. EPA's AIRNow website and the National Air Quality Index (AQI), a daily air quality report.

Citizen's Role:

There are a number of actions every citizen can take to reduce their contribution or exposure to SO₂:

- Use energy efficient appliances, such as those recommended by the Energy Star Program (www.energystar.gov).
- Reduce home energy consumption by turning off lights, televisions, and other appliances when not in use to reduce emissions from energy production.
- Insulate your home as best as you can. Set your thermostat lower in the winter and higher in the summer when you are away from home.
- Carpool, use public transit, bike, or walk whenever possible.

Additional Information:

- For more information on SO₂, please visit these IDEM websites:
 - www.IN.gov/idem/airquality/2343.htm for SO₂-specific information and information for other criteria pollutants for Indiana.
 - www.IN.gov/idem/airquality/2489.htm for air quality monitoring data for SO₂ and other pollutants.
 - www.IN.gov/idem/airquality/2379.htm for a map of SO₂ monitors and for the most recent SO₂ emission readings.
 - www.IN.gov/idem/airquality/2424.htm for the nonattainment status for Indiana counties or townships.
- For further information on the NAAQS, visit U.S. EPA's website at <http://epa.gov/air/criteria.html>.
- For questions and concerns, feel free to call IDEM's Office of Air Quality at (317) 233-0178 or (800) 451-6027, ext. 3-0178.